

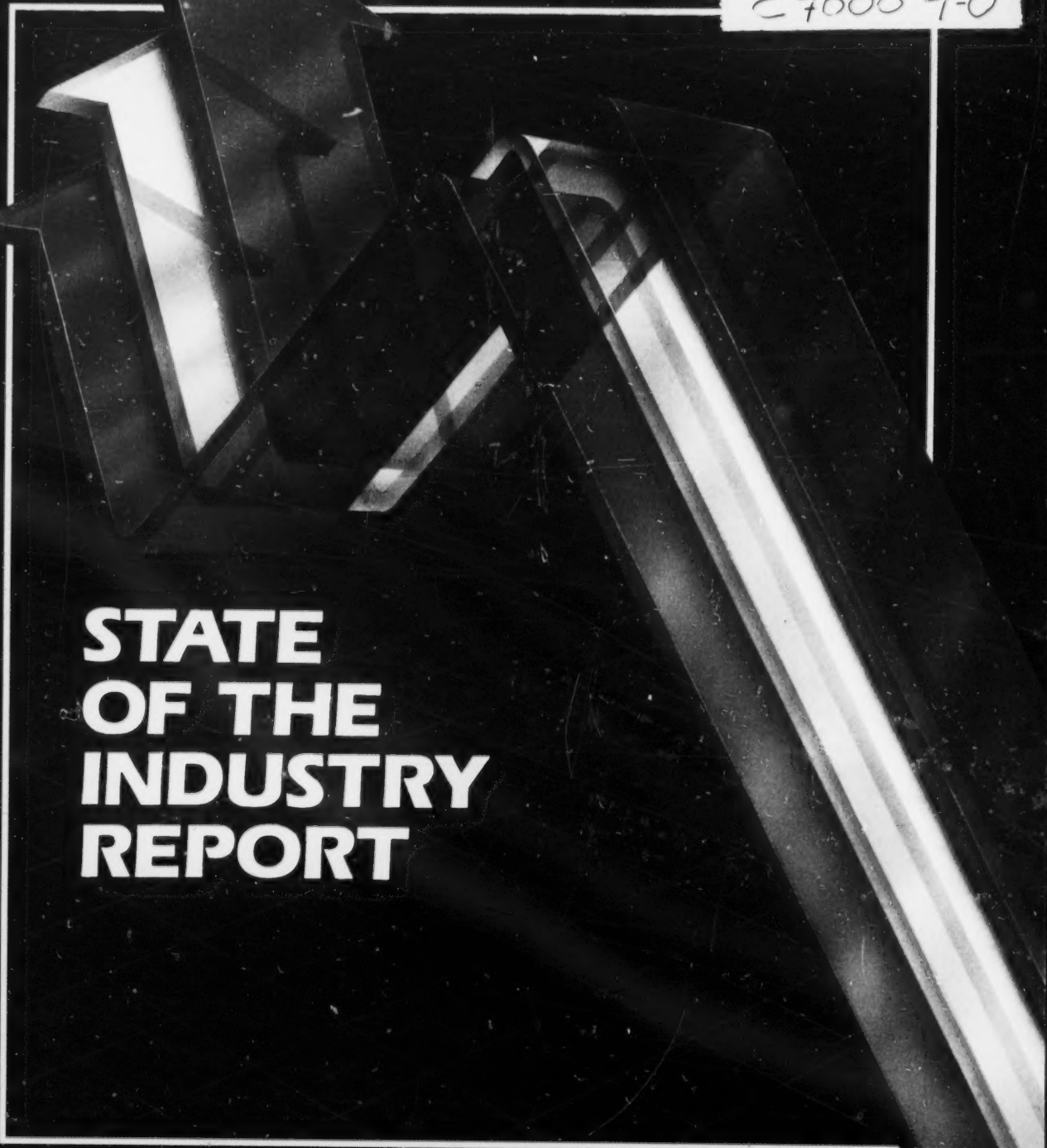
THE MAGAZINE OF METAL COMPONENT DESIGN AND PRODUCTION

NOVEMBER 1986

Precision Metal

Publication

C7000 1-U



**STATE
OF THE
INDUSTRY
REPORT**

Precision Metal

THE MAGAZINE OF METAL COMPONENT DESIGN AND PRODUCTION

editor and publisher
ROBERT WALSH

managing editor
KAREN A. MALEC

associate editor
DONALD J. FARLEY

associate editor
MARY M. WELCH

associate editor
JOHN R. WRIGHT

secretary
SHIRLEY GILBERT

art editor
DAVID H. BOSAK

senior market analyst
MICHAEL KEATING

western editor
LAD KUZELA

art director
LAWRENCE D. DAVIS

circulation director
GLORIA ADAMS

circulation manager
JEAN PICCIANO

marketing director
THOMAS J. HARMON

directories manager
JANE BOBULA

director of research
ROBERT SCHENK

copyright 1986 of Penton Publishing, Inc.
member of Business
Publications Audit of Circulation, Inc.

SUBSCRIPTIONS:

1 year: U.S. — \$35.00

Canada — \$50.00; International — \$60.00

Send payment in advance to

PRECISION METAL, P.O. Box 95795

Cleveland, Ohio 44101.

Single copies when available: U.S. — \$5.00.

Canada — \$7.00; International — \$9.00.

PRECISION METAL (ISSN 0032-714X)

is published monthly by Penton Publishing, Inc.,

a subsidiary of Pittway Corporation,

1100 Superior Ave., Cleveland, Ohio 44114.

Phone (216) 696-7000.

Postmaster: Second class postage

paid at Cleveland, Ohio and additional

mailing offices. Printed in U.S.A.

Return forms to 1100 Superior Avenue,
Cleveland, Ohio 44114.

FEATURES

State of the Industry Report..... 15

The state of the metalworking industries is detailed in this comprehensive report which describes 1986 activity and provides insights into 1987. The *Raw Material Outlook* presents an overview of the present condition of major industrial metals. The *Industry Reports* interpret the status of the precision metal industries, including statistics on capital equipment, material sales and end use markets.

Raw Material Outlook

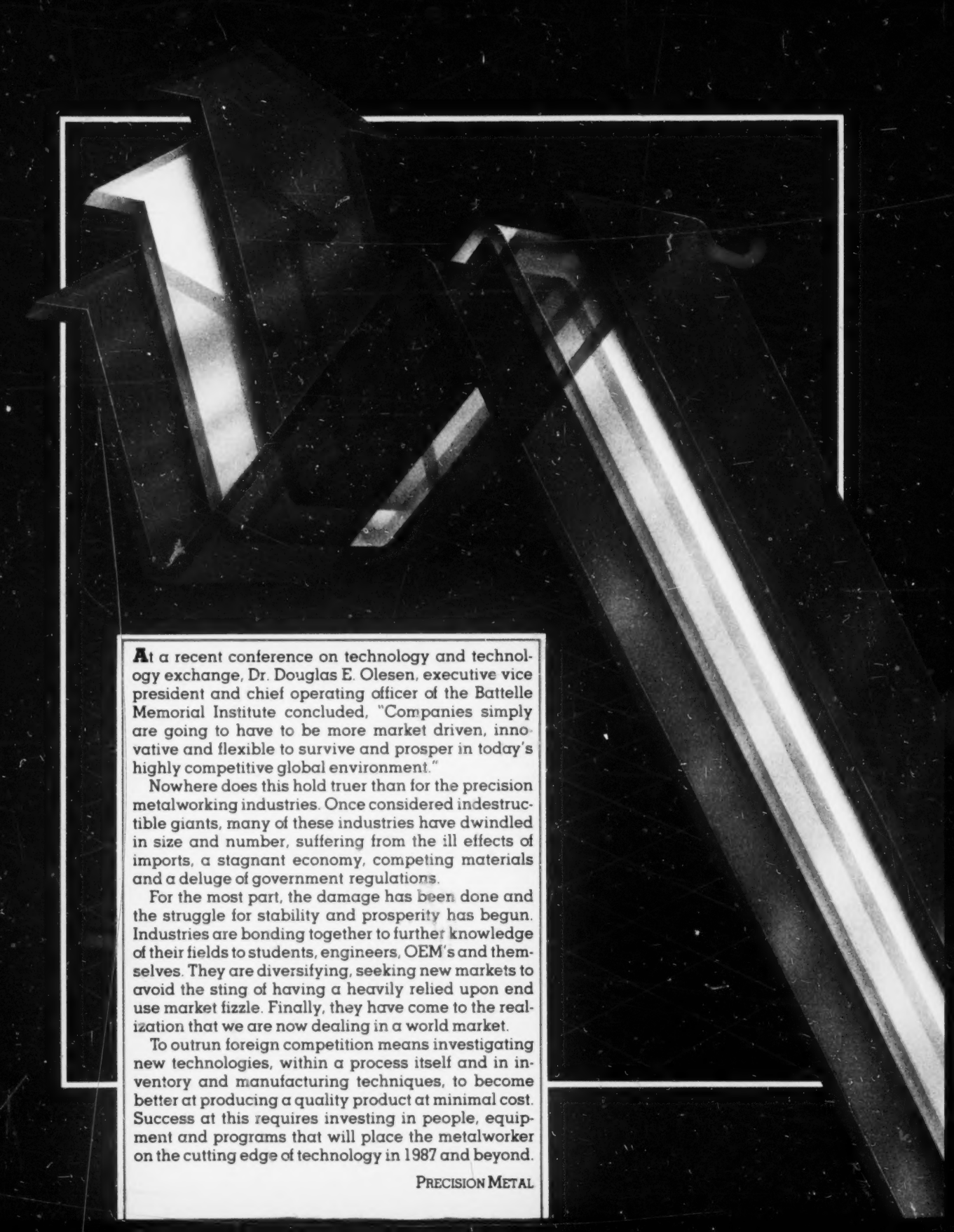
Aluminum	16
Copper	16
Magnesium	16
Nickel	19
Steel	19
Titanium	19
Tungsten	21
Zinc	21

Industry Reports

Die casting	22
Extrusion	28
Forging	32
Investment casting	39
Powder metallurgy	44
Roll forming	49
Stamping	53

DEPARTMENTS

Industry news	6	Classifieds	62
Useful literature	10	New products	65
People	12	Advertiser's index	68



At a recent conference on technology and technology exchange, Dr. Douglas E. Olesen, executive vice president and chief operating officer of the Battelle Memorial Institute concluded, "Companies simply are going to have to be more market driven, innovative and flexible to survive and prosper in today's highly competitive global environment."

Nowhere does this hold truer than for the precision metalworking industries. Once considered indestructible giants, many of these industries have dwindled in size and number, suffering from the ill effects of imports, a stagnant economy, competing materials and a deluge of government regulations.

For the most part, the damage has been done and the struggle for stability and prosperity has begun. Industries are bonding together to further knowledge of their fields to students, engineers, OEM's and themselves. They are diversifying, seeking new markets to avoid the sting of having a heavily relied upon end use market fizzle. Finally, they have come to the realization that we are now dealing in a world market.

To outrun foreign competition means investigating new technologies, within a process itself and in inventory and manufacturing techniques, to become better at producing a quality product at minimal cost. Success at this requires investing in people, equipment and programs that will place the metalworker on the cutting edge of technology in 1987 and beyond.

PRECISION METAL



Raw material outlook

Despite generally favorable forecasts for economic growth during 1987, many of the factors that will determine the strength of industrial metals are difficult to predict. The following is a brief appraisal of the current situation and long-term outlook, according to the U.S. Department of Commerce.

Aluminum

Net shipments for the first seven months of 1986, at an estimated 9,375 millions lb, were up 4.0% from the 9,011 million lb shipped during the comparable period in 1985. Domestic shipments of 8,853 million lb were up 7.7% from the 8,219 million lb shipped in the first seven months of 1985.

Aluminum shipments are expected to increase 2% in 1986 and reach 16.2 billion lb. Improved demand is expected this year in all major aluminum consuming markets with the exception of motor vehicle production, which is expected to decline by about 1.8%.

Total aluminum shipments are expected to increase at a compound annual rate of 3.5% through 1990. Aluminum consumption per unit of output in the automotive sector will increase. The dominant raw material for radiators is becoming aluminum, and major components of some new engines are now aluminum. These changes are expected to increase automotive use of aluminum from 137 lbs per car currently to 200 lb by 1990.

Because some of aluminum's major end-use markets have limited growth potential, such as beverage containers, and others are in intense competition with alternative materials, such as vinyl for siding, the industry is attempting to develop new markets. Defense related applications are being studied including aluminum-lithium alloys for aerospace applications, aluminum materials to replace

brass casings for bullets and shells, aluminum and plastic meal pouches, and lightweight armor. The commercial applications of primarily defense related products could open new markets.

Copper

Domestic copper producers found 1985 to be a difficult year, as low copper prices caused producers to incur substantial financial losses, close down unprofitable production facilities, and lay off workers. Total consumption of refined copper in 1985 was 2.25 million tons, about the same as 1984, and 23% above the depressed levels of 1982.

Low copper prices and direct import competition have led producers to diversify and significantly reduce costs. Some producers are shifting their emphasis to precious metal and energy-related production, while others are mining only their high-grade ore deposits. Domestic copper producers have lowered production costs by combining overhead and personnel reductions with new, more efficient production systems and processes such as leaching and electromining.

The demand for copper is expected to decline 2% this year, to 2.2 million tons. The weakest consumption sectors should be durable goods and automotive uses.

For the past decade, copper use has been declining in about 70% of copper-using sectors. These long-term declines result from substitution, miniaturization, and automotive downsizing. Also, few new markets have developed. The replacement of copper with aluminum in automotive radiators is expected to contribute to a 2% decline in refined copper consumption by 1990.

Fiber optics are expected to make inroads into the copper cable telecommunications market,

but are not expected to have a significant effect until the 1990s.

The greatest potential for copper demand appears to be in electricity, especially in developing nations. Electrical uses, particularly wiring cable, are copper's largest product category. Although electrical projects are certain to influence copper demand at some point, the debt crises of recent years have caused many projects to be delayed or cancelled.

Magnesium

Magnesium production during the second quarter of 1986 was 57,800 metric tons, up 900 metric tons from the first quarter of this year and up 600 metric tons from the second quarter of 1985. Shipments totalled 59,600 metric tons for the second quarter, up 3,000 metric tons from the revised 56,300 metric tons during the first quarter of 1986, but were the same for the second quarter of 1985.

Annual demand for magnesium is expected to increase only 10,000 tons between 1985-1990. However, North American magnesium capacity could increase to 100,000 tons by 1990 if two proposed Canadian plants are built. The consequence of this will be a fall in magnesium price, shutdown of capacity, or both. Magnesium consumption will continue to be dominated by its use as an alloying element in aluminum. With consumption projected to grow less than 1% per year to 1999, magnesium usage growth will be restrained.

The North American steel desulfurization market for magnesium is expected to peak during 1991-95, then fall off gradually. The outlook for magnesium castings appears optimistic, with an average annual growth rate of 5.8% between the years 1985-2000. The projection is based on anticipated



STATE OF THE INDUSTRY REPORT

reductions in the magnesium/aluminum price ratio.

Nickel

Continued consumer spending for durable goods and capital investment in plant and equipment promises growth this year in primary nickel demand. Domestic consumption of primary nickel in 1986 will increase 12% to 129,000 tons. U.S. mine production this year will approach 13,000 tons, providing about 10% of domestic nickel consumption. Primary nickel imports are expected to increase 3% to 152,000 tons.

U.S. primary nickel consumption will increase by 4.3% annually from a 1985 base of 115,000 tons to 142,000 tons in 1990. Although annual nickel demand may fluctuate, the growth rates of 6 to 8% seem to have ended with the 1970s. Energy conservation efforts have led to downsizing of automobiles and the use of lighter metals and other materials substituting for nickel-containing steels and nonferrous alloys. Miniaturization and plastics have reduced the nickel requirements for appliances and other consumer durables. Also, increased imports of automobiles, machinery, nickel-containing steel, particularly stainless, and offshore nickel-containing parts and equipment have reduced projected U.S. demand for primary nickel.

Despite the penetration of substitute materials, encouraging markets for nickel demand include use in new plants and equipment for the chemical, petroleum and energy-generating industries, as well as for pollution-abatement and waste treatment machinery for the minerals-processing, metal finishing, and pulp and paper industries.

Steel

The steel industry's struggle to become more competitive and profitable continues in 1986. Mergers, joint ventures and restructuring moves have been announced in efforts to raise cash, reduce debt and fight record import levels.

The industry continued to upgrade its raw steelmaking capacities, despite lower capital spending. Continuous casting increased to over 40% of steel production in 1985 from only 20% in 1980, and could expand by an additional 15 million tons to more than half of raw steel production by 1988. Because of the prohibitive cost of replacing existing facilities, the industry is adopting a number of technologies to improve efficiency such as computer process control, ladle metallurgy and water-cooled panels for electric furnaces.

Raw steel production in the first eight months of 1986 totalled 56,972,000 tons, representing 66.5% of production capability. Total shipments of domestic steel mill products through July 1986 were 42,677,000 tons. Shipments to the automotive industry, steel's largest consuming customer, declined 6.2% in the first seven months of this year.

Despite promising economic forecasts for 1986-90, a continued decline in the steel intensity of the economy is expected to dampen growth in steel consumption. Apparent steel consumption could reach 100 million tons by 1990 but seems unlikely to return to the 110-115 million ton range of the late 1970s.

While the minimills' share of domestic production could increase during the late 1980s, the strong growth they experienced during the 1970s shows few signs of continuing. The minimills have already achieved dominant shares in many of the markets in which they compete. The technology that would enable them to break into flat-rolled plate and large structural markets, which comprise the bulk of steel consumption, has not been developed.

Automobile sector demand for steel is expected to continue to decline. Domestic automobile producers may continue losing market shares to imports, as well as to U.S. assembled Japanese cars. Steel requirements per vehicle, which fell 35% from 1975-84 due to downsizing, are projected to de-

cline another 8% by 1989.

Steel has become a less important component in the economy because of substitution and, more importantly, because of the relatively slow growth of major steel-consuming industries. To successfully compete with substitutes like plastics, ceramics and aluminum that are making inroads into traditional steel markets, the steel industry must develop new products and new markets.

Titanium

Although the titanium industry has remained strong in 1986, shipments of mill products will be slightly below the 1985 level. Shipments are expected to slip in 1986 as a result of the completion of most mill product delivery schedules for the B-1 bomber. Orders for civilian aircraft are expected to remain strong, particularly for aircraft that contain large quantities of titanium.

Domestic production of sponge should reach 25,000 short tons, near the 1981 record high of 26,400 tons. Imports should increase slightly this year, reflecting the excess of world sponge capacity.

The outlook for titanium mill products through 1990 will depend on commercial and military aircraft procurements, which accounts for about 70% of titanium consumption. The increased demand for civilian aircraft that began in 1984 is expected to continue. A large increase in titanium demand may result from plans to replace aging airline fleets with lighter, more fuel-efficient planes that contain a larger proportion of titanium than current models. In addition, increased requirements for high-performance military aircraft and development of new alloys that will allow more extensive use of titanium in gas turbine engines may increase demand.

The recent expansion of world production capacities for sponge should ensure price moderation, helping titanium to compete with alternative materials such as advanced composites.

STATE OF THE INDUSTRY REPORT

Tungsten

After a considerable increase in 1984, domestic demand for tungsten experienced a minor setback in 1985. Despite increased shipments, the domestic mining industry remained depressed in 1985, providing only 15 to 20% of U.S. ore consumption compared with an average of 30 to 35% during the 1976-82 period.

With tungsten prices at extremely low levels, several major mines remained closed, and the industry operated at about 30% of capacity in 1985. Relatively little change is forecast in the domestic tungsten market by the end of 1986. Consumption of tungsten concentrates may rebound to near 1984 levels, but imports will continue to put pressure on domestic producers.

The prospects for 1987 and beyond are somewhat more encouraging. Growth in production levels of manufactured durables and key tungsten consuming end-use sectors are forecast to rise from 1986 levels. However, growth rates for industries such as construction, farm machinery, mining, and oil and gas extraction are expected to be lower, moderating tungsten demand. Also, structural changes within these end-use sectors may result in reduced usage. For example, the increasing use of coated cutting tools, estimated to be 50% of all machining applications, is expected to exceed 70% within the next decade. This trend, plus competition from ceramic materials and composites for a portion of the carbide markets, is likely to slow tungsten consumption in cutting tools and wear-resistant applications.

Zinc

Total zinc consumption is expected to increase 3% in 1986, to 915,000 tons. Zinc in galvanized steel is projected to increase to 440,000 tons, due to an expected growth in demand in the automobile sector, and will occur despite the projected decline in auto-

mobile production. The volume of new electrogalvanizing capacity, nearly 2.5 million tons this year, is indicative of automakers' intent to increase corrosion protection and extend the life of the average automobile. Automakers are expected to convert regular passenger cars to galvanized steel during the next few years. As a result, electrogalvanized sheet could account for 25% of total zinc consumption.

Zinc use in alloy die casting is expected to decline about 4%, to 245,000 tons, in 1986 due to moderation in consumer spending. Zinc die casting demand has declined for several years because of efforts to reduce automobile weight and the switch to thin-wall die cast parts.

In 1986, U.S. production of zinc is projected to remain unchanged at 330,000 tons. Slab zinc imports are expected to rise 7%, to 670,000 tons.

Looking ahead, the zinc industry should experience sustained growth, with consumption rising about 2% a year, to a total of 1.1 million tons in 1990. The long-term outlook for zinc in die castings is similar to that of galvanizing, which is the single largest application for zinc. Growth in this end-use sector will mirror demand growth in the automotive, appliance and construction sectors and will be sensitive to the overall health of the economy.

Zinc consumption in brass is expected to fluctuate along with demand for construction hardware, automotive and electrical parts. This zinc end-use will continue to depend upon the strength of the dollar and imports of foreign brass products. The consumption of zinc oxide in paint, rubber and agriculture is expected to remain secure, fluctuating with the economy.

OVER 50 YEARS PRODUCING ZINC AND ALUMINUM DIE CASTINGS



Zinc and Aluminum parts for textile machinery

For similar intricate design and problem castings too...

Send prints for prompt quotes

Sterling

RESEARCH
PARTICIPANT



DIE CASTING CO., INC.

735 39th Street/Brooklyn, N.Y. 11232/212-435-1420



STATE OF THE INDUSTRY REPORT

Die casting

Sales of die cast components are projected to reach 5.47 billion dollars in 1986, a 5.6% decrease from the 5.8 billion dollars in sales last year, according to American Die Casting Institute (ADCI) figures. Although this is an obvious downward trend from the recent high of 6.63 billion dollars in 1984, sales for the most part have reached a plateau. "Over the past few years, sales seem to be moving up and down between 5.5 and 6.5 billion dollars," explains Peter Findlay, president of the ADCI, "and we will most likely remain in this range until 1990."

What happens after 1990, according to Findlay, will depend on how successful the die casting industry is in developing new markets to offset business being lost to overseas producers or to competitive materials, and in implementing available technology for increased efficiency.

Sales of aluminum die castings have also stabilized, following a general economic period of slowing growth. However, the current outlook for aluminum remains bright as the automotive industry continues its trend of incorporating more castings into new models and designs, at times replacing engineering plastic applications with aluminum, zinc or magnesium. According to Tom Evans, vice president of sales, Spartan Aluminum Products, Inc., "A possible downturn in automobile sales volume in 1987 will be offset by these new projects and parts incorporating die castings."

Rapidly growing use of aluminum by the automotive industry can already be seen in Ford Motor Company's transmission components. "They recently added 390 aluminum die cast components to one of their transmissions," relates John Rutherford, vice president of sales & marketing, Aluminum Smelting and Refining Co./Certified Alloys Co. "Because of the reduced weight of aluminum die castings and the die caster's abil-

ity to make his component to net or near net shape, replacing cast and machined iron alloy components with aluminum will continue in the

automobile industry," adds Rutherford.

The use of light alloy automotive engine blocks by 1990 is also

Custom producers:

Die casting machines and furnaces

Custom producers of die cast parts reported that 92% of their breakdown and holding furnaces are fuel-fired while 8% are electric. Of the electric furnaces 96% are less than 10 years old. 69% of the fuel-fired furnaces are over 10 years old and

20% are over 20 years old. Respondents anticipate rebuilding or repairing 16% of their hot chamber machines in 1987. 8% of the cold chamber machines are expected to be rebuilt or replaced in 1987.

Die casting furnaces	How many furnaces do you have?	How many are 10-20 yrs. old?	How many are over 20 yrs. old?	How many do you expect to replace in '87?	How many do you expect to rebuild in '87?
Fuel-fired	573	279	117	16	92
Electric	52	2	—	—	—

Hot chamber machines (Size in tons of locking force)	How many machines do you have?	How many are 10-20 yrs. old?	How many are over 20 yrs. old?	How many do you expect to replace in '87?	How many do you expect to rebuild in '87?
Under 100	89	44	24	—	11
101-250	55	22	22	—	15
251-400	46	25	19	—	6
401-550	17	12	4	2	—
551-700	4	4	—	—	—
Cold chamber machines					
Under 100	4	2	—	—	—
101-250	16	2	10	—	—
251-400	48	27	21	—	6
401-550	86	40	31	—	4
551-700	147	104	25	—	11
701-850	42	20	2	—	6
851-1000	19	11	4	—	2
1001-2000	22	9	8	—	—
Over 2000	2	—	—	—	—



STATE OF THE INDUSTRY REPORT

boosting optimism in the die casting industry. Already common on many imported cars, the engine block will become the largest aluminum casting in a car, according to Rutherford.

A study recently released by the Zinc Institute indicates that the weight of zinc die castings used in the typical 1986 domestic automobile fell by 3.4% compared to the 1985 model year weight of 20.4 lb. "A contributing factor is the trend away from the use of carburetors in the favor of fuel injection," reports Dale Nevison, president of the Zinc Information Center. "While some components for fuel injection systems are zinc die cast, their total weight is less than that of the traditional zinc cast carburetors."

Another reason for the per car decline is the growing use of thin wall zinc die cast parts. These make maximum use of the metal's strength, and therefore are lighter

Die casting shipments (1000s of tons)				
Metal	1983	1984	1985	1986 ¹
Aluminum				
Custom	322	395	389	380
Captive	259	281	271	265
Zinc				
Custom	188	178	169	158
Captive	109	100	91	85
Magnesium				
Custom	4.5	5.3	6.4	6.75
Captive	0.8	0.94	1.14	1.10
Source: American Die Casting Institute ¹ Projected				

and more cost efficient than traditionally designed die castings, according to the Institute. In many cases, automotive components originally zinc die cast were replaced by engineered plastics, and are just now returning to thin wall zinc.

Perhaps the alloy with the greatest growth potential in die casting is magnesium. Many advantageous properties including light weight, high strength and excellent corrosion resistance make it ideal for many intricate thin wall applications. "Magnesium is in its infancy and is just beginning its incline," observes Dean Akerson, director of marketing for Die-makers, Inc. "It is becoming more and more accepted as a viable material. As knowledge of its capabilities grow, so will its applications. Engineers and material specifiers are becoming more comfortable with it."

The die casting industry overall has "emerged from the dark ages." Today, there is more control over the process and better knowledge and investment in state-of-the-art equipment. Quality control measures are being implemented today that just a few years ago were unheard of. A consensus of those connected with the die casting industry believe these modern manufacturing techniques are leading to a polarization within the industry. "More than ever before, the stronger companies are getting larger and the weaker companies are becoming smaller," notes Findlay. "The die caster who has not put money into improvement of his plant and part quality is falling by the wayside," states Evans. "He is a dying breed."

What this means, according to Findlay, is that in the future, fewer

Cost of nonferrous castings ¹ purchased (millions of \$ delivered cost) ²			
End use markets	1977	1982	1987
Communication equipment			
Telephone/telegraph (aluminum & alloy)	9.2	6.6	10.6
Radio/TV communication equipment (aluminum & alloy)	51.4	74.8	116.9
Electronic computing equipment			
(aluminum & alloy)	39.5	104.4	220.3
(other nonferrous)	—	8.6	18.1
Household appliances			
Cooking equipment (aluminum & alloy)	6.6	41.7	60.8
Laundry equipment (aluminum & alloy)	17.6	17.7	22.7
(zinc & alloy)	7.4	4.8	6.2
Electric housewares (aluminum & alloy)	29.0	14.2	14.7
(zinc & alloy)	5.6	24.4	25.3
Lawn & garden equipment			
(aluminum & alloy)	20.1	33.5	42.5
(other nonferrous)	—	5.6	7.1
Motor vehicle parts & accessories			
(aluminum & alloy)	536.1	691.3	1119.9
(zinc & alloy)	—	22.7	36.7
Power driven hand tools			
(aluminum & alloy)	36.5	39.9	53.1
(other nonferrous)	—	9.5	12.6
¹ Rough & semifinished			
² Rated at value or projected value of the dollar for each year listed			
Sources: U.S. Department of Commerce & Penton Marketing Information estimates			



STATE OF THE INDUSTRY REPORT

companies will be around to absorb about the same amount of business available now. Progressive die casters are also noting that more of their customers are using single source die casting, or

dividing up their business between fewer die casters. Their customers are demanding quality castings.

Imports have only hastened this polarization of die casters. "The do-

mestic die casting industry is being driven by international competition," explains Rutherford. "Many domestic die casters are reacting quickly and with purpose. Reinvestment in cutting edge technology such as computerized shot end control in die casting machines is contributing to the ability to now make castings with complexity, wall thicknesses and dimensional tolerances not seen before."

The message being sent is clear. Reinvestment in technology and quality will lead to survival and prosperity in the die casting industry.

continued on page 28

Capital equipment: Die casting machines

According to our survey of die casting machine builders, sales of hot chamber machines in 1985, the first half of 1986 and orders for 1987 outnumber cold chamber machines by about a 2 to 1 margin. This implies that custom producers are gearing

up for small zinc and magnesium part production. Overall, first half of 1986 units shipped equal 67% of 1985 totals and orders for 1987 equal 70% of the total 1985 die casting machine sales.

Probably the Most Versatile Roll Former You Can Buy.



ARTOS AU 1.5 With Adjustable Gear Driven Horizontal Centers* Runs a Wide Range of Products.

- Adjustable horizontal centers, 11" minimum • Adjustable vertical centers, 4" to 7½" • 1½" diameter hardened and ground spindles • Ground shoulders for positive roll alignment • Individual micrometer roll adjustment
- Fully hardened gear train—1:1 or 1.5:1 gear ratios available • Quality bearings throughout—sturdy welded box-type frame • Roller edge sheet guides in feed table • Standard models for 7" or 20" girths • Speeds and tooling to suit

Artos AU 1.5 Roll Formers are designed for fast, easy tool change, and years of dependable operation. Optional equipment includes measuring systems, shears, presses, decoilers, variable speed drives and more. Model shown features optional rotary punch and louver units.

Artos can build a roll former or an entire roll forming system to your specific needs. For a quotation, send us your profile requirements.

*Patent Pending

Manufacturers of High Quality Roll Forming Machines for Over 30 Years.
Roll Forming Division, 1164 N. 54th St., Milwaukee, WI 53208 • (414) 778-5050
Toll Free 1-800-27ARTOS

Artos
Engineering Company.

Circle 40



STATE OF THE INDUSTRY REPORT

Die casting answers its competition

As most metalworkers know all too well, the precision metal manufacturing industries have suffered severe economic blows over the last few years. Many components that were once the exclusive domain of the kingpin—metal, now can be efficiently designed and produced in plastic or other composites. Global competition for a limited portion of the custom production business has become commonplace. This has contributed to stiffer competition from rival metal component manufacturers over an already tight market.

Realizing there is no easy solution to these realities of modern day competition, the die casting industry has decided to pull together its resources to survive, stabilize and prosper now and in the future.

The Diecasting Development Council was recently organized to perform this task. Its broad base represents all segments of the industry in expanding the total market for die castings in aluminum, zinc, ZA and magnesium.

The Council has already begun its program of raising large amounts of money through percentage of sales contributions from those connected with the

industry.

Money collected from the die casting program will be used to fund industry activities that promote market development.

Specifically, the Council will create a continually expanding body of product design and engineering information regarding die casting and each of its competitive processes, valuable enough to OEM product designers to command their immediate attention. This documentation will be created by product engineers with broad experience in materials and product design, as well as in the die casting process. The program will incorporate support for key ongoing industry research programs, aimed at utilizing advanced technology to produce quality die castings, and enhance the ability of North American die casters to compete effectively in a worldwide marketplace.

This new information will be presented in accessible formats, including eventual CAD interfacing, for ready understanding and involvement by all design engineering personnel, manufacturing engineering and purchasing management. Seminars, workshops and self-instructional videotapes could

be provided, and a "Die Casting Design" toll-free hot line is proposed for instant information access by OEM engineers and specifiers.

The information will be promoted across the North American OEM marketplace through widespread communication using all appropriate media channels, and through utilization by the die casting industry itself. An editorial publicity program will reach many industries and job functions, and a high-impact advertising program will be used to promote today's die casting capabilities.

Die casting product design booklets, complete manual and computer-readable data will be made available to all. Industry investors in the program will have special privileges in using copyrighted program elements in their own sales activities.

While funds from the development program itself will directly help support ongoing research and educational activities of participating industry associations, these associations will also have access to all materials and program data produced. Therefore, industry research activities will be further multiplied by feedback from the program.

Extrusion

A slight increase in sales projected for the 1986 business year did not materialize for most extruders. "Production is down this year in every category," reports Donn Sanford, executive director of the Aluminum Extruders Council (AEC). "Extrusion customers are aware of the fluctuation of metal prices and are either specifying smaller orders, or asking for guarantees of price adjustment as these prices fluctuate. This leads to smaller backlog."

Precision Extrusions, Inc. is one extruder well aware of just such a pricing problem. According to its president, Richard Ziehm, "Sales are down over last year because we've sacrificed volume to hold price. We refuse to reduce prices as severely as people have requested." Ziehm believes this downward trend will continue as long as domestic extruders continue the practice of "cut-throat" pricing. Instead of concentrating on competition from foreign coun-

terparts, "...the reality is we are competing against one another and cutting each other's throats," continues Ziehm. He says this is a result of poor marketing, a problem the AEC (of which he is vice-chairman) has begun working on.

"This price cutting is happening in all alloys," states Robert Rains, vice president and general manager of Taber Metals, Inc. He notes that as a smaller extruder, his company must compete with lower prices "...or you simply won't get



STATE OF THE INDUSTRY REPORT

any business."

The other competition extruders are contending with includes composites. Extruders supplying shapes for window applications are the most likely to be hurt, with many metal parts being replaced with vinyl. This may indirectly hurt custom producers by forcing window component extruders to enter other custom markets.

Bigger threats though, are coming from overseas competitors. "Right now the primary import problem is in distributor and jobber standard shapes such as rod, bar and tube," says Sanford. "Foreign metal costs are much cheaper, allowing foreign extruders to sell their products in this country for much less than a domestic extruder." Sanford adds that importation of assemblies containing foreign extrusions is posing as much of a problem as the importation of extruded components.

Quality control and computer-aided design (CAD) measures for a better extrusion are two methods to combat imports, particularly in the low volume, custom area where customers are demanding a quality product. Most large custom extruders report a long term commitment to CAD, calling the cost

Cost of extruded aluminum shapes ¹ consumed (millions of \$ delivered cost) ²			
End use markets	1977	1982	1987
Aerospace equipment & parts			
Aircraft	63.2	83.4	126.0
Aircraft engines & engine parts	8.1	31.4	42.4
Other aircraft equipment	29.8	87.5	141.3
Communications equipment			
Radio/TV sets	3.1	—	5.1
Telephone/telegraph	3.6	5.7	9.1
Radio/TV communication equipment	17.5	20.0	31.3
Electronic computing equipment	4.7	20.0	42.2
Fabricated structural metal products			
Metal doors, sash & trim	340.0	568.7	618.7
Architectural metal work	29.1	54.6	59.4
Prefabricated metal buildings	10.3	32.6	42.4
Household appliances			
Cooking equipment	7.6	10.6	15.5
Refrigerators & freezers	—	12.2	15.3
Electric housewares & fans	4.2	6.8	7.0
Motor vehicles & equipment			
Motor vehicle & car bodies	—	23.1	33.0
Truck & bus bodies	18.0	25.1	50.1
Vehicle parts & accessories	37.7	18.9	26.5

¹Includes rod, bar, pipe & tube

²Rated at value or projected value of the dollar for each year listed

Sources: U.S. Department of Commerce & Penton Marketing Information Center estimates

an investment. Quality programs such as statistical process control are being implemented to not only

produce a higher quality extrusion, but produce it more efficiently with minimal cost and waste.

Tied closely with pricing headaches for the extruder is the question of how much inventory to stock with such constant variations in aluminum price. Should the extruder solidify his metal price three to five months in advance, or buy material as needed —just-in-time (JIT)? "Most people are still checking to see which works best for their business," says Sanford. "With metal prices fluctuating all the time, I think JIT will be constantly evaluated. No extruder wants to tie up his money in inventory, although this is the way it has been done traditionally in order to stabilize price."

"JIT is a terrific concept, but who wants to carry the inventory?" reports Ziehm. "Over the years, it has been the extruder. But now it has become the prime producer who is taking the licks. With the market

Custom producers: Extrusion presses

Based on our survey of custom producers of extruded metal products, 81% of extrusion presses are rated under 1000 tons. An additional 17% are in the 1001-3000 ton category. 97%

of all presses are over 10 years old and 56% are over 20 years old. Custom producers expect to replace and rebuild about 8% of the presses.

Presses (Size rating in tons)	How many presses do you have?	How many are 10- 20 yrs. old?	How many are over 20 yrs. old?	How many do you expect to re- place in '87?	How many do you expect to re- build in '87?
Under 1000	239	87	150	—	21
1001-3000	50	31	14	2	—
3001-5000	4	2	—	—	—
5001-7000	—	—	—	—	—
Over 7000	4	3	1	—	—



the way it is, they are being forced to carry it to supply the extruder demanding JIT."

Capital equipment: Extrusion presses

Manufacturers of extrusion presses responding to our survey indicated that sales for the first half of 1986 approached 1985 total sales and orders for 1987 already are considerably higher than 1985 shipments.

Shipments of extruded aluminum shapes¹ (millions of pounds)

	1982	1983	1984	1985	1986
January	130.9	135.9	172.9	191.7	205.7
February	127.9	141.8	175.5	184.2	196.6
March	143.9	165.6	190.1	198.1	206.9
April	143.5	156.2	179.3	206.2	219.1
May	146.6	154.8	190.9	199.8	216.0
June	156.8	171.8	192.2	195.0	211.5
July	142.2	156.8	182.8	200.4	201.8
August	149.4	177.9	197.9	204.1	(NA)
September	144.6	167.8	192.8	199.8	(NA)
October	142.7	177.0	205.1	220.7	(NA)
November	142.9	163.9	181.3	190.9	(NA)
December	132.0	144.9	165.6	162.0	(NA)

¹Domestic receipts only, does not include import receipts
Source: U.S. Department of Commerce, Bureau of the Census

Forging

In 1985, offshore imports reached 32% of the total consumption of impression die forged products in the U.S. and Canada. Offshore penetration accounted for 12% of machined steel forgings contained in imported end-use products which, aided by a strong U.S. dollar, have flooded the domestic market. Although forging industry sales volume in 1985 virtually matched 1984 levels, attrition since 1979 has now closed about 70 forging plants involving a permanent loss of 11,000 jobs. Despite the fact that the U.S. dollar's strength has dropped in 1986, it is not likely to be a big factor in U.S. industry's struggle with imports. Foreign sources are not expected to give up easily on market shares they've already gained. Data is incomplete concerning 1986 import statistics, but industry experts feel the percentages are not going to decrease, and may go up.

There is no simple solution to the pressures facing the forging industry. "I think the domestic market will continue to shrink for a long time," states Robert Atkinson, executive vice president of the Forging Industry Association (FIA).

"There is overcapacity not only in the U.S., but throughout the world. As a result, the intense competition will continue and there's going to be more out of business situations, not only here but abroad as well.

"The biggest problem is that offshore governments don't want unemployment so they will subsidize," he continues. "It's a political situation in that companies will continue operating at a

continued on page 37

Cost of forgings purchased (millions of \$ delivered cost)¹

End use markets	1977	1982	1987
Aerospace equipment & parts			
Aircraft (iron & steel)	27.9	15.6	23.4
(aluminum & alloy)	45.5	63.6	96.1
(titanium & alloy)	37.0	—	116.2
Aircraft engines and engine parts			
(iron & steel)	106.1	510.1	688.1
(aluminum & alloy)	4.6	15.1	20.4
(titanium & alloy)	62.6	345.3	465.8
Other aircraft equipment (iron & steel)	31.9	87.6	141.5
(aluminum & alloy)	30.8	63.1	101.9
(titanium & alloy)	—	8.3	13.4
Farm machinery & equipment			
(iron & steel)	96.9	89.9	90.8
Motor vehicles and equipment			
Motor vehicle parts & accessories			
(iron & steel)	997.3	1048.7	1698.9
(aluminum & alloy)	46.2	15.9	25.8

¹Rated at value or projected value of the dollar for each year listed
Sources: U.S. Department of Commerce and Penton Marketing Information Center estimates



STATE OF THE INDUSTRY REPORT

continued from page 32

loss rather than have people out of work. One of our frustrations is the failure of our government to create 'fair trade' or seemingly to even care about the health of domestic manufacturing industries."

A recent report by the International Trade Commission (ITC) titled, "Competitive Assessment of the Forging Industry" found U.S. forgers to be more advanced than the rest of the world in aerospace forging technology and about equal in other areas. The findings indicate that although the same technology is available to U.S. and foreign forgers, U.S. forgers may not be utilizing as much modern equipment. This reflects the U.S.

Custom producers: Forging machines, presses & hammers

Mechanical Presses (by tons force rating)	How many presses do you have?	How many are 10-20 yrs. old?	How many are over 20 yrs. old?	How many do you expect to replace in '87?	How many do you expect to rebuild in '87?
Under 100	3	3	—	—	—
100-500	67	35	26	2	—
501-1000	38	13	20	2	2
1001-2000	35	10	19	—	5
2001-5000	18	2	8	—	4
5001-10,000	6	4	—	—	—
Over 10,000	4	—	—	—	—
Hydraulic Presses					
100-500	14	4	8	—	—
501-1000	13	7	3	—	2
1001-2000	35	20	9	—	2
2001-5000	18	6	12	—	5
5001-10,000	13	3	6	—	2
Over 10,000	6	—	4	—	2

Hammers (by lb. mass of ram)	How many hammers do you have?	How many are 10-20 yrs. old?	How many are over 20 yrs. old?	How many do you expect to replace in '87?	How many do you expect to rebuild in '87?
Less than 1000	12	—	11	—	2
1001-5000	187	19	144	2	9
5001-10,000	38	2	36	—	—
10,001-25,000	25	—	25	—	—
Over 25,000	9	—	9	—	—

Mechanical forging machines (includes hot/cold headers, upsetters, forge rolls-by in. capacity)	How many machines do you have?	How many are 10-20 yrs. old?	How many are over 20 yrs. old?	How many do you expect to replace in '87?	How many do you expect to rebuild in '87?
1/2	11	4	4	2	2
1	15	12	3	2	2
1 1/2	6	2	4	2	—
2	2	—	2	—	—
2 1/2	11	2	6	—	1
3-4	7	—	7	—	—
5-6	8	2	6	—	—
Over 6	1	—	1	—	—

Respondents to our survey reported that 69% of their forging hammers were between 1001-5000 lbs mass of ram. 91% of the hammers are over 10 years old and 83% are older than 20 years. Custom forgers plan to rebuild or replace about 5% of their hammers in 1987.

About 47% of all forging machines reported are in the 1/2 - 1 1/2 in. capacity range. While 81% are at least 10 years old and 40% are older than 20 years, producers plan to replace or rebuild about 16% of their machines.

According to our survey, 83% of the forging presses are mechanical. Of these, 61% are in the 100-1000 ton force range. 71% are at least 10 years old and 43% are over 20 years old. Rebuilding or replacement is planned for 9% of the mechanical presses. 54% of the hydraulic forging presses were reported to be in the 1001-5000 ton force range. Most (93%) are over 10 years old and 53% are over 20 years old. There are rebuild or replacement plans for 13% of the hydraulic presses.



STATE OF THE INDUSTRY REPORT

industry's inability to generate profits sufficient to fund increased investment in plant and equipment.

At the time of the ITC study, the cost of domestically produced raw material such as steel was found to be anywhere from 22-36% higher than offshore, based on 1985 prices. "This is no longer true," explains Atkinson. "Domestic steel producers have reduced their prices so that raw material is not the problem it used to be."

"We don't feel we are in any way inferior technologically, our raw material and energy costs are competitive and overcapacity exists here and abroad. But governments handle it differently."

One strength of the industry is short runs that must be purchased domestically. Atkinson adds that this is an advantage because the industry is seeing more short runs, and products and end-use products are reduced in quantities. "It's not the big, expanding economy that we had for so many years," he notes.

Many industry experts believe that the future will bring more concentrated, specialized forging operations. The companies that survive and are successful will be the "niche" producers — the ones

that find a specialty and become a primary supplier in that market. U.S. forgers are also responding to competitive conditions by initiating new cost reduction programs.

A number of cost-effective methods are being studied by Wyman-Gordon Co., Worcester, MA. One of these is a process called hot die forging, in the 1200-1300°F. range. "This will provide a very cost-effective method for producing turbine components to a more refined shape," states Jack Odell, vice president of sales and marketing of Wyman-Gordon. "We hope to be able to cut the number of forging operations that are necessary."

"We have also implemented SPC extensively in our plants as part of our efforts to become a low cost producer," relates Odell. "We feel that we have done everything possible to lower our costs, but the problem of offshore competition continues to grow because of unfair pricing."

Wyman-Gordon recently filed an anti-dumping petition with the U.S. Dept. of Commerce and the U.S. International Trade Commission charging that imported forged crankshafts are being sold below fair market prices. A countervailing duty petition was also

filed charging that the government of Brazil subsidizes crankshaft exports.

"We hope the outcome will be to restore legal competitive pricing to the U.S. marketplace for that product," adds Jack Anderson, manager of media relations of Wyman-Gordon. "We feel we have a very strong case."

Capital equipment: Forging machines, presses & hammers

While no sales of forging machines were reported for the first six months of 1986, our survey indicated that there are 1987 orders for machines in the 1/2, 1, and 5-6 in. capacity categories.

Most of the forging presses shipped in 1985 and the first half of 1986 were mechanical. No hydraulic presses were reported on order for 1987.

Forging hammers in the first six months of 1986 equal the total sales for 1985. Several are on order for 1987. All sales and orders were for forging hammers rated at less than 1000 lbs mass of ram.

Investment casting

A gap is widening in the investment casting industry. Those involved in commercial investment casting, so heavily dependent on the condition of the general economy, are still struggling, while those involved in aerospace and aircraft investment casting continue with excellent growth.

"Aerospace investment casters have it made until at least 1990," concludes Henry Bidwell, executive director of the Investment Casting Institute. "This is due in part to the large defense budget, but is also due to growth in the civil aircraft market as well, including construction of new airliners and retrofits of newer, fuel efficient en-

gines." Federal Aviation Administration demands for increased plane refurbishments are expected to also boost business.

Aerospace investment casters agree with Bidwell. "All aerospace areas of our business are ahead of

1985, especially the military end," notes Michael Perry, sales manager, Arwood Corp. "Our commercial air business is a growing percentage of sales, also higher than 1985 figures."

A West Coast investment caster,

Capital equipment: Investment casting wax injectors/wax extruders

Overall, wax injector & wax extruder shipments for the first half of 1986 were at 91% of 1985 total sales. Wax injector sales were up while shipments of wax extruders were down. Our survey results indicate that the

pendulum has completed another half cycle. This year, as in our 1984 survey, wax injectors dominated sales. In 1985 respondents indicated higher wax extruder sales.



STATE OF THE INDUSTRY REPORT

Precision Founders, Inc., attributes rapid growth in their company to aerospace engine business. "Sales in the aerospace engine hardware end are up, due largely to thin wall and larger casting techniques," says Richard Warshawer, vice president of sales and engineering. "We look for this growth to continue."

The "rock solid" outlook for aerospace investment casting sales has little in common with the commercial caster's future. "Many of the commercial investment casters

that were doing very well a few years ago will be lucky to break even during the next few years," states Bidwell. This can be blamed partially on sluggishness in the general economy. But an increasing portion of the blame is going to offshore competition.

Currently, imports have almost no affect on aerospace investment casting sales. This is due, in part, to the demanding specifications and requirements put on a casting by the military. According to Warshawer, the foreign foundries don't

have the necessary technology to meet the demands. "The State Department shutdown of technology outflow from the United States has left the foreign casters to develop it themselves." Warshawer adds that even if the technology were developed, it would most likely not be supported by major engine manufacturers in the United States.

The story is quite different for commercial investment casters and could get worse as investment casting grows in popularity, particularly in high volume areas. "The commercial end of investment casting is having tougher times than it has ever seen before," reports Walter Lutz, president of Signicast Corp. "There is plenty of competition in the commercial end among domestic investment casters. This is healthy because we are all playing the same game on a level field. But the competition from overseas is unhealthy and unfair. The rules are not the same."

To answer this competition, Signicast is investing money in capital equipment and improving the process where and when possible. "In the lower quality, higher quantity castings, imports are eating into our business. To compete, we must use better technology to produce higher quality, more advanced castings, and give our customers the service and delivery they need. In other words, we must be ten times better than the foreign casters just to compete."

Aerospace investment casters are also keeping up with state-of-the-art equipment and quality control measures, but for very different reasons. "We update our equipment not because of the obsolescence factor or import competition," states Warshawer, "but because of better methods often offered by new equipment and techniques."

"With the kind of sophisticated parts we make," explains Perry, "we must keep up with state-of-the-art. Size and mechanical properties that are demanded by the aerospace industries we serve keep changing. To keep the business, we will continue to invest in equipment and people."

Custom producers:

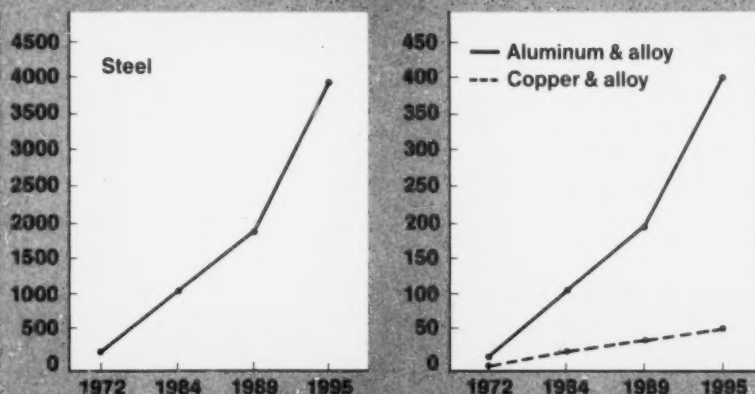
Investment casting wax injectors/wax extruders

About 38% of the injectors and extruders are over 10 years old and only 15% are over 20 years old. There are plans to rebuild

or replace 16% of the total number of wax injectors and wax extruders in 1987.

	How many injectors, extruders do you have?	How many are 10-20 yrs. old?	How many are over 20 yrs. old?	How many do you expect to replace in '87?	How many do you expect to rebuild in '87?
Wax injectors	200	87	29	16	18
Wax extruders	51	21	8	2	4

Investment casting shipments
(millions \$)¹



¹Rated at value or projected value of the dollar for each year listed.
Source: The Freedonia Group, Inc.



STATE OF THE INDUSTRY REPORT

Powder metallurgy

If the U.S. automotive industry increases its usage of powder metallurgy parts from the current 15 to 20 lb per car to the projected 40 lb per car in the near future, the P/M industry will prosper as a result. Despite successful market diversification efforts in recent years, the automotive industry still accounts for 70% of the output of P/M parts in North America. This is a "mixed blessing," according to Kempton Roll, executive director of the Metal Powder Industries Federation (MPIF). "The American automobile industry is up against tough competition these days and is clearly operating in a survival mode."

As an example of P/M inroads in cars, the Federation cites a high strength P/M alloy steel forged internal ring gear used in GM truck automatic transmissions and a 4600 forged steel P/M transmission race used in the new Ford Sable and Taurus model cars. The internal ring gear has a surface tensile strength of 300,000 psi and a tensile strength of 220,000 psi in its core. The Ford automatic transmission race was designed as a P/M forging to obtain improved fatigue and impact properties.

The P/M industry's move toward diversification during the past four years has led to increased market shares in appliances, hardware, power tools and garden equip-

ment. "Appliances, both major and small, are holding up quite well and represent about 10% of the total market dispersal for P/M parts last year," relates Roll. "Lower interest rates and increased housing starts signaled an upturn in demand, which is now beginning to manifest itself."

Roll states that business machines and farm machinery markets are slipping, mostly due to a softness in the data processing market and the plight of the American farming industry. This market represents about 7% of the total. The use of P/M parts in garden equipment (lawn mowers and tractors), power tools and hardware items represent 13% of last year's output.

Iron and steel powders remain the dominant raw materials used in P/M parts production, reaching 89% in 1985, at the expense of copper, brass, tin and aluminum powders. Stainless steel, at 1.4% of parts production last year, is increasing in tonnage while aluminum seems to be falling off. "However, the capability is in place to manufacture aluminum P/M parts and there are several companies in the U.S. that are prepared to do so when the application warrants," notes Roll.

Total metal powder shipments in 1985 declined about 10.5% to

Capital equipment: P/M sintering furnaces

Electric sintering furnaces shipped in the first half of 1986 were 2/3 of 1985 sales and 25% of 85 levels are on order for 1987.

269,200 tons, compared to the previous three years.

"Shipments for the first six months of 1986 were up, with projections for the second half to be down," states Peter Johnson, marketing director of the MPIF. "We're looking at annual shipments level with 1985 or up only slightly." According to Johnson, this can be attributed to both inventory adjustments and the impact of foreign imports in terms of automobiles and sub-assemblies such as transmissions and engines.

Although foreign competition has become a very real threat in other metalworking industries, imports are a relatively new concern in P/M. "We're not seeing direct competition yet as far as parts from overseas, but we're losing business because the automotive companies are importing components such as engine parts, power steering and transmissions," explains Herbert Tews, president of Midwest Sintered Products Corp., Riverdale, IL.

Roll reports that an investigation by the Powder Metallurgy Parts Association (PMPA) revealed that 2.1 million engines and 1.6 million transmissions were imported in 1985 by North American automakers. This translates into 1.9 million fewer automotive applications available to America's P/M industry than in 1979. "The fact that the American P/M industry's output to these same automakers actually increased during this period indicates that we are doing a pretty good job of developing new automotive applications under difficult circumstances," says Roll.

The PMPA found that the industry has lost an estimated market

**Cost of metal powders consumed
(millions of \$ delivered cost)¹**

End use markets	1977	1982	1987
Farm machinery & equipment	3.5	0.6	.6
Household appliances			
Laundry equipment	1.6	7.6	9.8
Electric housewares & fans	4.4	—	5.7
Lawn & garden equipment	7.3	9.8	12.4
Metalworking machinery & equipment			
Metal cutting machine tools	0.2	0.9	1.0
Special dies, tools, jigs & fixtures	9.8	18	23.3
Machine tool accessories	134.2	124.8	132.7
Motor vehicle parts & accessories	56.8	76.9	124.6

¹Rated at value or projected value of the dollar for each year listed

Sources: U.S. Department of Commerce & Penton Marketing Information Center estimates



STATE OF THE INDUSTRY REPORT

share of 2 to 3% to overseas producers. While this is not a huge amount, it is as Roll put it, "enough to be worrisome."

"More significantly, unfair pricing or uncommonly low foreign labor rates are not the only problem," Roll continues. "There are differences in marketing techniques, quality and performance

that are just as important."

Michael MacKay, chairman of the PMPA Foreign Relations Committee states, "Although imported finished items and sub-assemblies have been offset by increased utilization of P/M parts in the remaining units, some parts, particularly at the low technology end, will no doubt be lost to countries with

wage costs far below ours." He adds that the key to retaining market shares in high technology P/M parts is improved quality and more aggressive introductions of new technology.

The P/M industry must join forces and work together to stay ahead of the competition, believes Tews. "What we're doing is developing close partnership or joint venture relationships to openly share new technology, new alloy systems, cost reduction goals and new materials.

"We've named our second company Partnership P/M because we feel it's a new partnership with our customers in product development through powder metal technology," says Tews. "We believe this approach of technical staffs interfacing will help us in the future."

An important resource of the P/M industry is the Center for P/M Technology. The Center currently operates out of the same headquarters as the MPIF in Princeton, NJ, but is governed by an independent board of trustees and is a separate entity from the MPIF.

The money raised by the Center will go directly to universities in support of their efforts involving P/M, explains Roll. The industry derives a two-fold benefit in that attention from the academic community and their intellectual resources are focused on solving some of the technical problems facing the industry, in addition to exposing more young people to P/M technology and the opportunity to attract them into the industry.

"The fact that we're working together on education and new markets and applications is probably the single most important development in the industry today," claims Tews. "It's strengthening our industry and making it more resilient and adaptable to change."

Roll concludes, "The cooperation and coordination of these two — the corporate world and the academic world — is essential to the realization of P/M technology's growth potential."

Powder shipments for P/M parts (1000s of tons)

	1981	1982	1983	1984	1985	¹ 1986
Iron powder	134	111	154	183	163	175
Copper and copper base powder	19	14	18	21	16	16

Source: Metal Powder Industries Federation ¹Projected

Custom producers: P/M compacting presses & sintering furnaces

Custom producers of P/M parts responding to our survey stated plans to replace or rebuild about 14% of their sintering furnaces in 1987. 76% of the furnaces are over 10 years old and 23% are more than 20 years old. Of the sintering furnaces, 92%

are electric.

Mechanical presses were reported to constitute 84% of all presses used to compact metal powders. Overall, 1/3 of the presses are over 20 years old and 10% will be rebuilt or replaced next year.

Compacting presses	How many presses do you have?	How many are 10-20 yrs. old?	How many are over 20 yrs. old?	How many do you expect to replace in '87?	How many do you expect to rebuild in '87?
Mechanical	475	174	161	1	42
Hydraulic	92	36	32	—	11

Sintering furnaces	How many furnaces do you have?	How many are 10-20 yrs. old?	How many are over 20 yrs. old?	How many do you expect to replace in '87?	How many do you expect to rebuild in '87?
Electric	231	120	51	4	25
Fuel-fired	19	13	6	4	2



STATE OF THE INDUSTRY REPORT

Roll forming

Most roll formers are a little disappointed in 1986. The roll forming industry tends to mirror the state of the general economy, and most people agree that 1986 has not reached the expectations of one year ago. However, because of a diversified customer base, roll forming traditionally has been able to do very well, even in weak markets.

According to Robert Boeddener, president of the Custom Roll Forming Institute (CRFI), "This industry has been almost recession-proof for the past 12-14 years. Roll forming is an advantageous process that has been able to compete and find new business, even in a declining market.

"Although 1986 is not meeting original projections, the year started out with much optimism, as did predictions for 1985," continues Boeddener. "People are starting to recognize that economic swings are very unpredictable. These forecasts are based on extremely hard to discern criteria."

One custom roll former states, "I hope I'm wrong, but 1987 looks to be as flat as 1986."

Roll forming has not been as hurt by imports as some metal-working areas in recent years, but the industry is now beginning to feel the effects.

"Foreign imports still affect roll forming relatively little," states Boeddener. However, he warns that in this high-tech age, the ability to send drawings and quotations around the world in a matter of seconds through facsimile reproduction and electronic communication, is resulting in some jobs being filled overseas that a few years ago would not have been. "Producers are starting to get concerned and stay alert to what's going on in the way of imports," adds Boeddener.

Although imports are not a big problem now, roll formers are worried about a growing threat. Charles Freel, president of Tele-

dyne Metal Forming, Elkhart, IN, relates, "Imports have affected us very little, but unfortunately it may just be the start. We're seeing it in the textile industry where metal channels are used on looms for weaving cloth. Since most textile weaving equipment comes from overseas, it's natural for them to try to service that industry from the OEM rather than buying domestic.

"We are still supplying them, but saw a swing to overseas when the dollar was strong," adds Freel. "Now that the dollar is weakening, we'll probably see it swing back."

One roll former expressed another concern regarding foreign competition. Tim Synk, sales manager of Superior Roll Forming Co., Cleveland, OH, observes, "In addition to offshore producers sending parts into the U.S., we also are up against U.S. companies that are relocating entire plants overseas."

The general consensus among roll formers seems to be that import restrictions may help in the short-term, but are not the answer.

The U.S. must make adjustments and learn to compete. This would be much easier if all countries "played by the same rules." Government subsidies in many countries give foreign manufacturers economic advantages for the foreign company's products to be sold to the U.S. As one roll former put it, "Foreign governments support industry and ours doesn't."

Many producers in the roll forming industry believe that the advanced technologies of CAD/CAM and SPC will help the roll former remain competitive in future years. Most roll formers are looking into CAD/CAM and have implemented SPC at least on a limited basis.

"Once we learn the proper measures to use to set up the systems, SPC will be beneficial," states Freel. "But on a small run item, where do you economically implement the controls to give you the most from your process? On medium to long runs it will pay for itself, but we have not yet deter-

Capital equipment: Roll forming machines

According to our survey of roll forming machine builders, sales for the first half of 1986 were 73% of the total 1985 shipments and orders for 1987 are 35% of 1985 totals. For all three years, mid-sized machines (9-20 roll stations) constitute 75-80% of all sales. Demand for large ma-

chines with over 25 roll stations appears to be increasing with 1986 figures exceeding 1985 sales and 1987 orders equal to 1985 totals. Overall, survey results seem to indicate cautious confidence in the future of roll forming.

Machines (by number of roll stations)	Units shipped in 1985	Units shipped first half of 1986	On order for 1987
2-4	4	2	—
5-8	14	13	9
9-12	52	36	21
13-15	47	31	7
16-20	19	16	11
21-25	7	4	—
Over 25	4	5	4



STATE OF THE INDUSTRY REPORT

mined how to implement SPC so that it actually is a benefit.

"In the area of CAD/CAM, we are just starting to use the computer to help us determine reductions in roll passes or reductions of some of our products," continues

Freel.

Currently, a major problem in the industry is in the area of raw materials supply. When asked to describe the quality of raw materials in the past year, one roll former replied, "Terrible!" Most roll for-

mers complain of problems ranging from cross wrinkles to rust.

"The experienced people we were used to working with have left the steel business," comments Lou Collieran, vice president of sales at Roll Formed Products Co.,

continued on page 59

Custom producers: Roll forming machines

Roll Forming Machines (by number of roll stations)	How many forming machines do you have?	How many are 10-20 yrs. old?	How many are over 20 yrs. old?	How many do you expect to replace in '87?	How many do you expect to rebuild in '87?
2-4	24	14	10	—	8
5-8	54	21	26	3	6
9-12	108	67	38	2	17
13-15	21	3	17	—	—
16-20	12	—	12	—	6
21-25	29	21	8	3	4
Over 25	5	3	2	—	2

Respondents to our survey report that 95% of their roll forming machines are over 10 years old and almost 45% are over 20 years old. As a result, there are a relatively high number of rebuild/replacement plans for 1987. Rebuilding is being considered over replacing machines by a five to one margin. Our survey responses indicated that about 64% of all roll forming machines are in the 5-12 roll station range.

Steel Extrusions & Hollow Bar For Exacting Needs

Specializing in custom extruded shapes, structurals, and Hollow Bar.



Plymouth Tube Company

P.O. Box 11A, Winfield, IL 60190 1-312-682-1100 TWX: 910-252-2126

1-800-323-9506

RANGE OF CAPABILITY

NEAR NET EXTRUSIONS

MATERIAL: Carbon, Alloy, Stainless Steels, Titanium and Nickel Alloys.

SIZE: Cross section must be able to fit with a 5-1/2" circle.

Minimum thickness .187".

Minimum cross section .4".

Mass between 1.4 and 35 lbs. per linear foot.

STANDARD STRUCTURAL STAINLESS SHAPES

Equal and Unequal Leg Angles, Tee's, I Beams and Channels

HOLLOW BAR

1" OD to 33/4" OD

.125" to .875" Wall

Round, Hex and Square OD with Round ID

ASK FOR OUR FREE
DESIGNER'S REFERENCE GUIDE



STATE OF THE INDUSTRY REPORT

Stamping

The jury is still out on how the 1986 domestic automobile producer buyer incentive plans will affect 1987 model year sales. What is certain, however, is that late 1986 sales were adequate enough to spark a strong output of components for both custom and captive stampers connected with the industry.

The net effect of these sales on the 21 billion dollar stamping industry has been *no change*, due to such end use market diversity. According to Jon Jenson, president of the American Metal Stamping

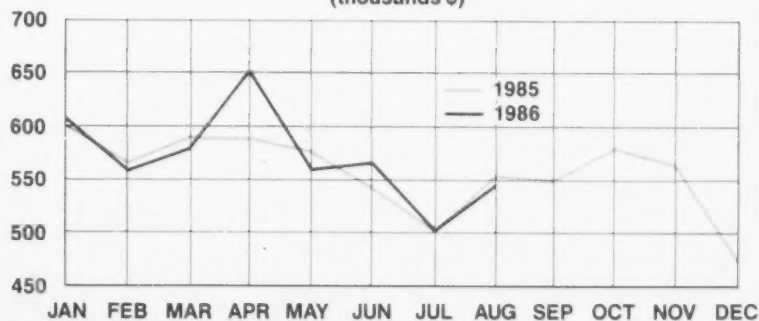
Cost of metal stampings consumed (millions of \$ delivered cost)¹

End use markets	1977	1982	1987
Electronic components			
Electron tubes, all types	15.5	37.2	45.3
Semiconductors & related devices	68.6	94.3	167.4
Electronic connectors	12.2	34.4	61.2
Farm machinery & equipment	48.2	68.0	68.7
Motor vehicles & equipment			
Motor vehicle & car bodies	6638.0	5065.6	7243.8
Truck & bus bodies	—	25.7	51.3
Vehicle parts & accessories	79.0	228.1	319.3
Office equipment			
Electronic computing equipment	67.4	94.5	199.4
Typewriters & other equipment	37.5	26.3	32.6

¹Rated at value or projected value of the dollar for each year listed

Sources: U.S. Department of Commerce & Penton Marketing Information Center estimates

Stampings, fabrications & spinnings shipments
(thousands \$)



Source: The American Metal Stamping Association

Association (AMSA), industry shipments have been seesawing modestly over the first three quarters of 1986, with shipments about 1% above those for the first 9 months of 1985. More of the same is expected through the remainder of the year.

Backlog for the industry is about 3% above levels of one year ago, and should remain unchanged into 1987, according to AMSA. "The industry has reached a plateau," observes Jenson.

Areas currently experiencing slow growth in sales include elec-

Custom producers: Stamping presses

Roughly 89% of the stamping presses used by respondents to our survey are mechanical while the remaining 11% are hydraulic. 84% of the mechanical presses were reported to be rated under 100 tons force. Of the mechanical presses, almost 49% are over 20 years old and 82% are over 10 years old. About 7% of the mechanical presses will be rebuilt or replaced in 1987. There were no rebuild/replace responses received for hydraulic presses. Hydraulic presses were predominantly in the 11-50 ton (30%) and 101-500 ton (35%) capacities.

Mechanical Presses (by tons force capacity)	How many presses do you have?	How many are 10-20 yrs. old?	How many are over 20 yrs. old?	How many do you expect to replace in '87?	How many do you expect to rebuild in '87?
1-10	122	39	44	11	13
11-50	257	77	174	6	—
51-100	166	62	47	7	5
101-500	105	42	50	4	2
Over 500	2	—	2	—	—
Hydraulic Presses					
1-10	16	8	2	—	—
11-50	25	14	3	—	—
51-100	4	—	—	—	—
101-500	29	3	—	—	—
Over 500	8	—	2	—	—



STATE OF THE INDUSTRY REPORT

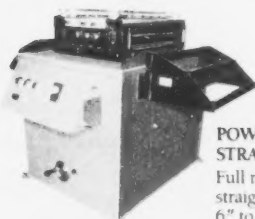
"It is very hard to take a company seriously that is not making investments in new technology."

tronics stamping. "We might see an improvement in early 1987 sales, but it will be nothing like the

business we had in 1983 and 1984," says Robert Nellemann, vice president of sales and marketing for

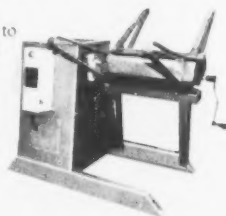
When You Need Press Room Equipment,

You Need Press Room Equipment Company.



COIL HANDLING EQUIPMENT

Payout reels from 500 to 10,000 lbs., single and double arbor

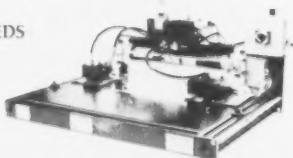


POWERED STRAIGHTENERS

Full range of motorized straighteners, AC or DC, 6" to 48" wide. Air-operated pinch rolls standard.



AIR FEEDS



Double gripper air feeds with adjustable height, heavy-duty cabinet and other options. 126 models to choose from.

Single gripper air feeds. 145 models to choose from, up to 48" stroke standard. Longer strokes available.

AIR FEEDS—Fastest feed rate and longest stroke lengths in less space.

PAYOUT REELS—Single and double arbor reels up to 10,000 lbs.

STRAIGHTENERS—Powered up to 3/8" stock and pull-through up to 5/16" stock.

Send us your application and specs. We'll prove ourselves with our prices.

Call 417-468-2800 or write for our free full-line catalog.

Press Room Equipment Company
A Division of Tyler Coupling Company
(formerly Plessey Air Feeds)

1300 Tyler Road
Marshfield, Missouri 65706-0927



**PRESS ROOM
EQUIPMENT
COMPANY**

Diebel Mfg. Co. He projects an 8 to 10% increase in sales next year for Diebel, a company with 80% of its business comprised of electronics stamping. "A few years ago, the automotive stampers were in a slump and our business was booming because personal computer, word processor and printer sales were also booming. Now the tide has turned," adds Nellemann.

Efforts to improve productivity by moving into new end use markets and therefore, limiting dependency on one industry, are becoming more common in the metalforming arena. "To survive in a limited or no-growth business we are improving market share and reaching out into different areas, including exotic applications in the pharmaceutical and petrochemical industries," reports Robert Calcagni, vice president of the Metal Products Group, Commercial Shearing, Inc.

"We are also implementing an SPC program and applying the techniques to more and more products and pieces of equipment," adds Calcagni. Most stampers

Capital equipment: Stamping presses

Mechanical stamping press sales for the first half of 1986 were about 40% of the total units shipped in 1985. No orders were reported for 1987. Presses in the 1-50 ton range comprised about 80% of all press sales reported, with about 50% being in the 11-50 ton force capacity range.

Mechanical presses (by tons force capacity)	Units shipped in 1985	Units shipped first half of 1986
1 - 10	137	46
11 - 50	217	97
51 - 100	74	31
101-500	22	6



STATE OF THE INDUSTRY REPORT

"To survive in a limited or no-growth business, we are improving market share and reaching out into different areas..."

agree that implementing modern quality, inventory and delivery techniques is necessary for sur-

vival in the stamping industry. "This is a tough industry, and the only way to grow is to be as aggres-

sive as your resources allow you to be," says Nellesmann. "This includes using SPC and just-in-time (JIT) delivery systems."

Nellesmann adds that investing money on capital equipment such as CAD/CAM systems, is a must to hope for a future in the stamping business, particularly in small, precision stamped components. "It is very hard to take a company seriously that is not making investments in new technology," maintains Jenson.

Imports have been, and will continue to be an obvious threat to the domestic stamping industry via components as well as assemblies. Most stampers have accepted this fact of worldwide competition by now and are beginning to take reactive measures. "We have all come to realize that you

"This is a tough industry, and the only way to grow is to be as aggressive as your resources allow you to be."

must be much smarter in how you purchase and produce, and in handling labor and fixed costs," remarks Calcagni.

In addition to the better inventory control and delivery systems already mentioned, earlier design consultation between the stamper and OEM is essential to avoid wasted time, metal and overall efficiency.

"In the future, we are going to see shorter runs, shorter product life cycles, faster set-ups and increased JIT delivery," predicts Jenson. "Metalforming will have to seek more opportunity to do more operations to add more value to a product. The stampers that perform this will prosper." **PM**



CASTMANSHIP.

cast-man-ship (kăst • mən ship), n.

1. The art, skill, and science of professional die casters combining their expertise and craftsmanship. 2. The ability to produce quality custom zinc and aluminum castings to your exacting specifications. 3. The capability to provide complete precision, CNC and secondary machining of both zinc and aluminum die castings. 4. The dedicated philosophy of exacting controls of all quality and process variables in the production process. 5. The expertise to transform a concept into a production part efficiently and cost effectively.

Synonyms: see or call



ST. CLAIR INDUSTRIAL PARK
P. O. BOX 290
ST. CLAIR, MISSOURI 63077-0290
314-629-2550



STATE OF THE INDUSTRY REPORT

continued from page 50

Div. of Hynes Industries, Youngstown, OH. "It's our feeling that a lot of the expertise left with them and hasn't been replaced."

The effects of takeovers, strikes and lockouts are definitely being felt in the industry. Freel observes, "One problem is that steel inventories are drying up in the U.S. We buy a lot of material through steel warehouses. A good percentage of that is being purchased overseas because steel distributors buy both foreign and domestic.

Tighter raw materials supply means longer delivery time and higher prices. These are direct results of the unsettled conditions in the steel industry, and could string out lead times for the roll former.

"We were capable of turning orders in two to four weeks during the past two years," reports Freel. "In 1987, we may be returning to longer lead times. The material will still be there, but it will take longer to get it in and naturally, the price will be higher." One roll former stated this opinion for getting steel on time in 1987, "The situation has got to improve. It can't get any worse."

Plastics and composite materials have eroded some of the end-use markets in other metalworking industries and probably will continue to do so. Most roll formers accept competition from composites as inevitable, but cite several examples of jobs that were taken away and later returned to the roll forming process.

One example given is that of a de-watering device for paper pulp used to make paper. A fiberglass composite was being used as the guide for the de-watering device. A roll former was able to convert it to stainless steel, which gives the paper manufacturer a longer life than they were getting from the plastic device.

Freel is hopeful that the trend toward composites such as plastic will not exclude roll forming. "Everyone is experimenting with developing a composite that will be able to withstand the heat and stress corrosion necessary for use

in the aerospace industry," he notes. "But I'm not saying it will leave out the roll former, because some of this material is supposed to be roll formable. So rather than lose the aircraft business, maybe we can substitute."

Roll forming is expected to gain momentum during the next dec-

ade, in both custom and captive markets. "We don't mind a growing captive market because that says roll forming is the way to go in metalworking," adds one roll former. "It demonstrates roll forming is a viable manufacturing process and from a custom standpoint, we hope to follow along." **PM**

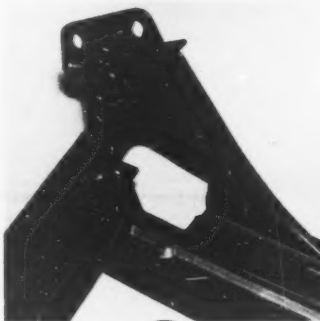
Spartan + Magnesium = A Magnitude of Benefits.



Spartan has repeatedly produced award-winning results with our expertise for high quality Magnesium casting designs. Pictured is Spartan's Pontiac Fiero casting, which exhibits the numerous structural, performance, financial and design advantages of Magnesium. With Spartan's Magnesium castings, expect:

- Excellent strength-to-weight ratio.
- Lower cost than other structural materials.
- Exceptional tool life: Over 450,000 pieces per die . . . AND still going strong!
- Thin walls of 0.050 inches; other applications down to 0.035 inches.
- Complicated parting line and difficult trim requirements BUT feasible with innovative Magnesium casting design.
- Perfect quality rating for nearly one million parts, verified by the customer!
- SPC throughout Spartan's operation, including on-line computer monitoring.
- Complete assembly, ready for installation.
- Just In Time delivery.
- CAD/CAM capability.
- High purity alloy and fluxless melting assuring excellent corrosion resistance.

Our specialty isn't just castings: It's solutions.




SPARTAN
Celebrating 25 years
of performance excellence.

©Spartan Aluminum Products, Inc. 1986.

Write or call for our brochure:
Spartan Aluminum Products, Inc.
P.O. Box 130 Sparta, Illinois 62286
618 / 443-4346